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FIG. 1

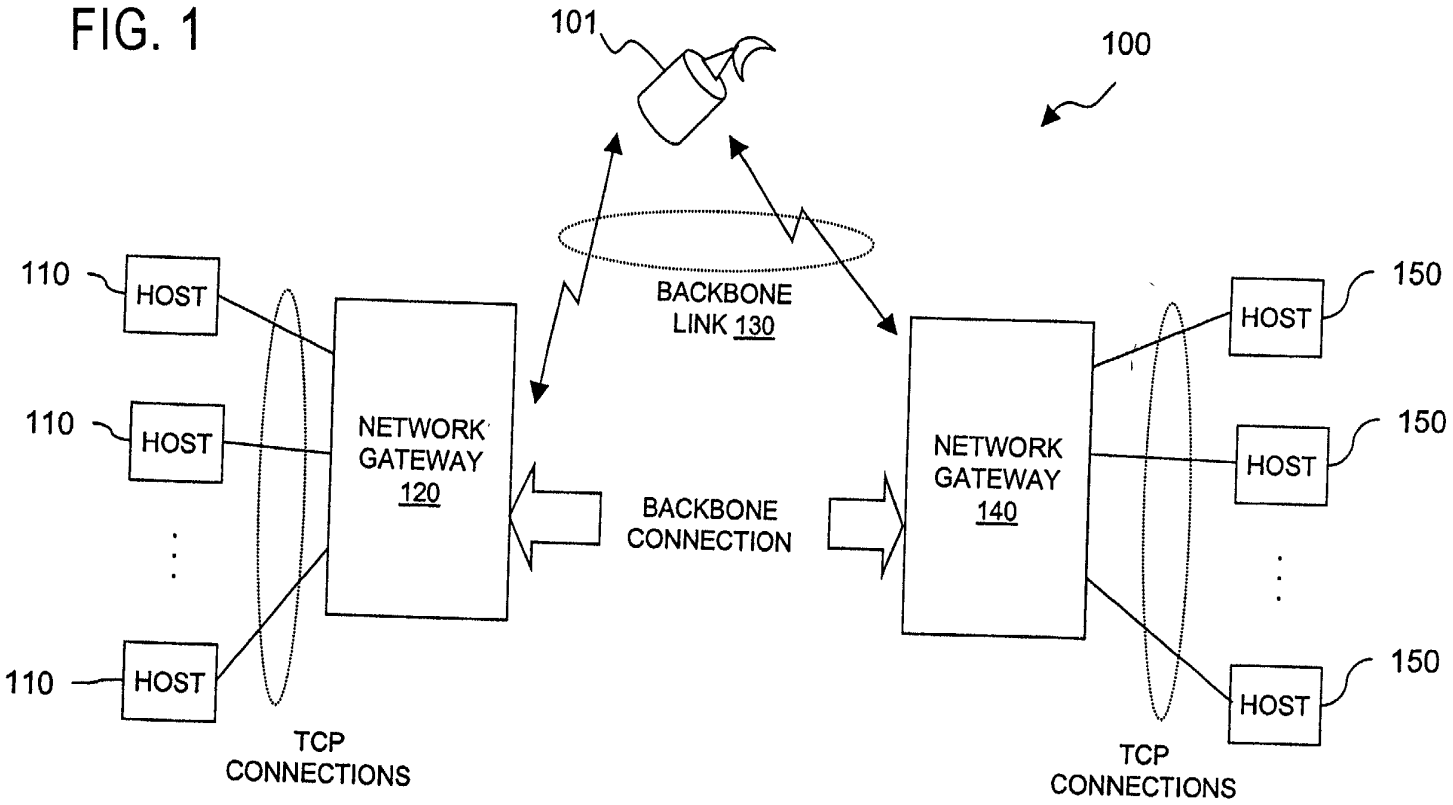

FIG. 2

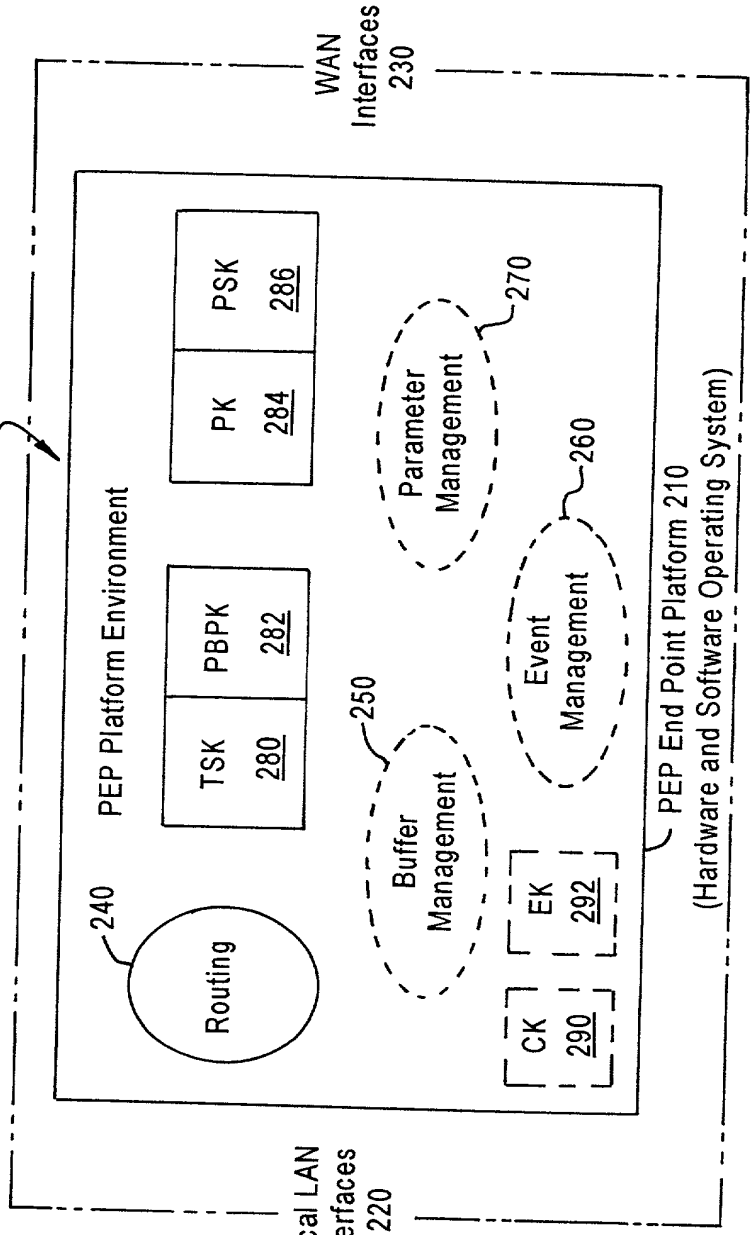
120, 140
200
WAN Interfaces 230
PEP Platform Environment
TSK 280
PBPK 282
PK 284
PSK 286
240
Routing
250
Buffer Management
270
Parameter Management
260
Event Management
CK 290
EK 292
PEP End Point Platform 210
(Hardware and Software Operating System)
Local LAN Interfaces 220

FIG. 3

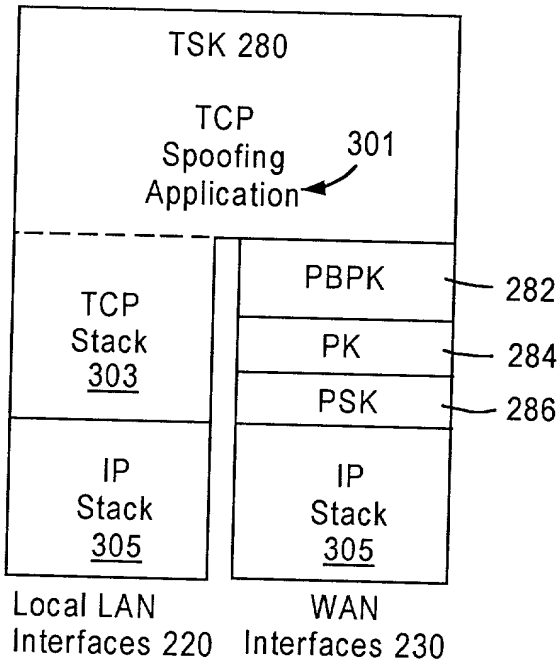
TSK 280
TCP Spoofing Application
301
PBPK
282
PK
284
PSK
286
TCP Stack 303
IP Stack 305
IP Stack 305
Local LAN Interfaces 220
WAN Interfaces 230

FIG. 4A

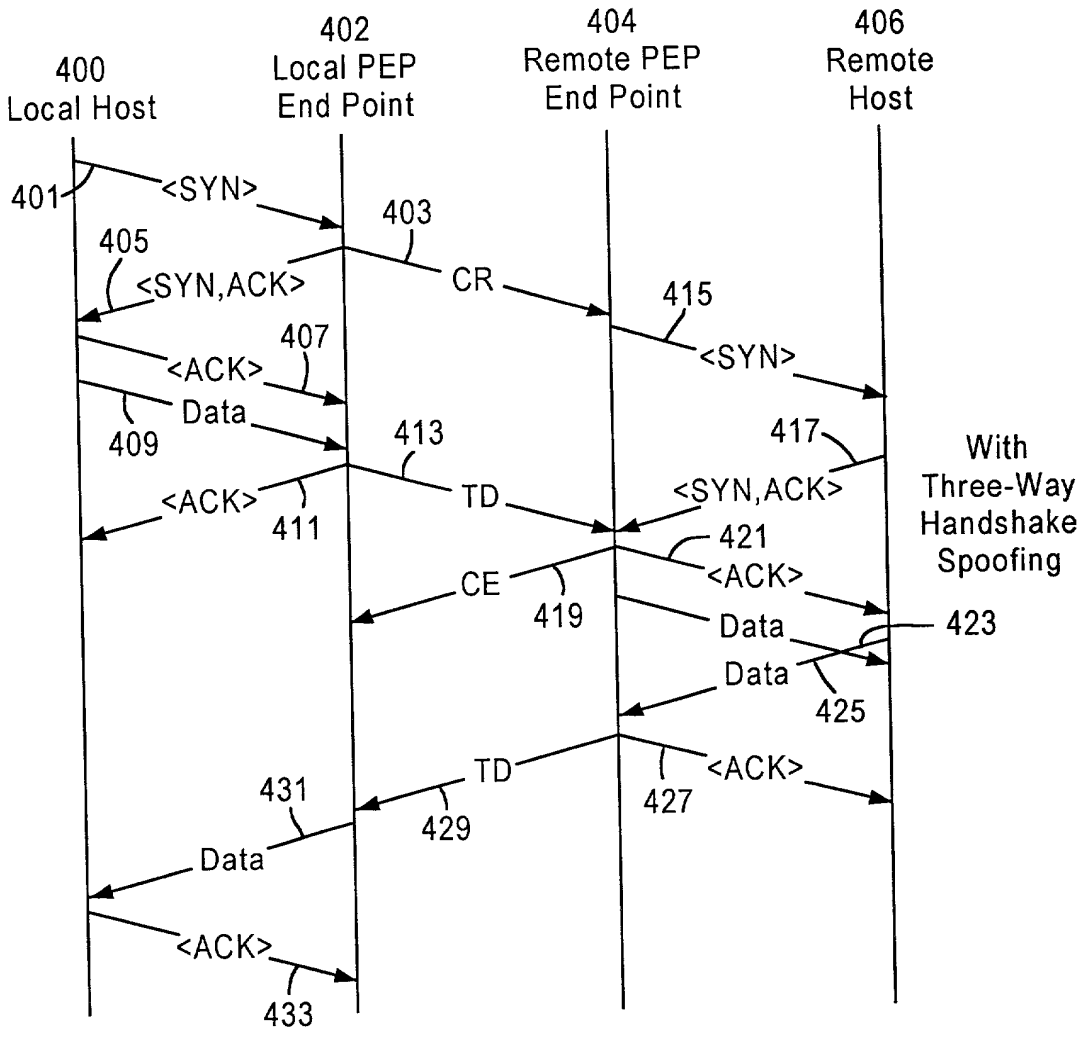
400
Local Host
402
Local PEP
End Point
404
Remote PEP
End Point
406
Remote
Host
401
<SYN>
403
CR
405
<SYN,ACK>
415
<SYN>
407
<ACK>
Data
409
413
TD
417
With
Three-Way
Handshake
Spoofing
<ACK>
411
<SYN,ACK>
421
<ACK>
CE
419
Data
423
Data
425
TD
<ACK>
427
431
429
Data
<ACK>
433

FIG. 4B

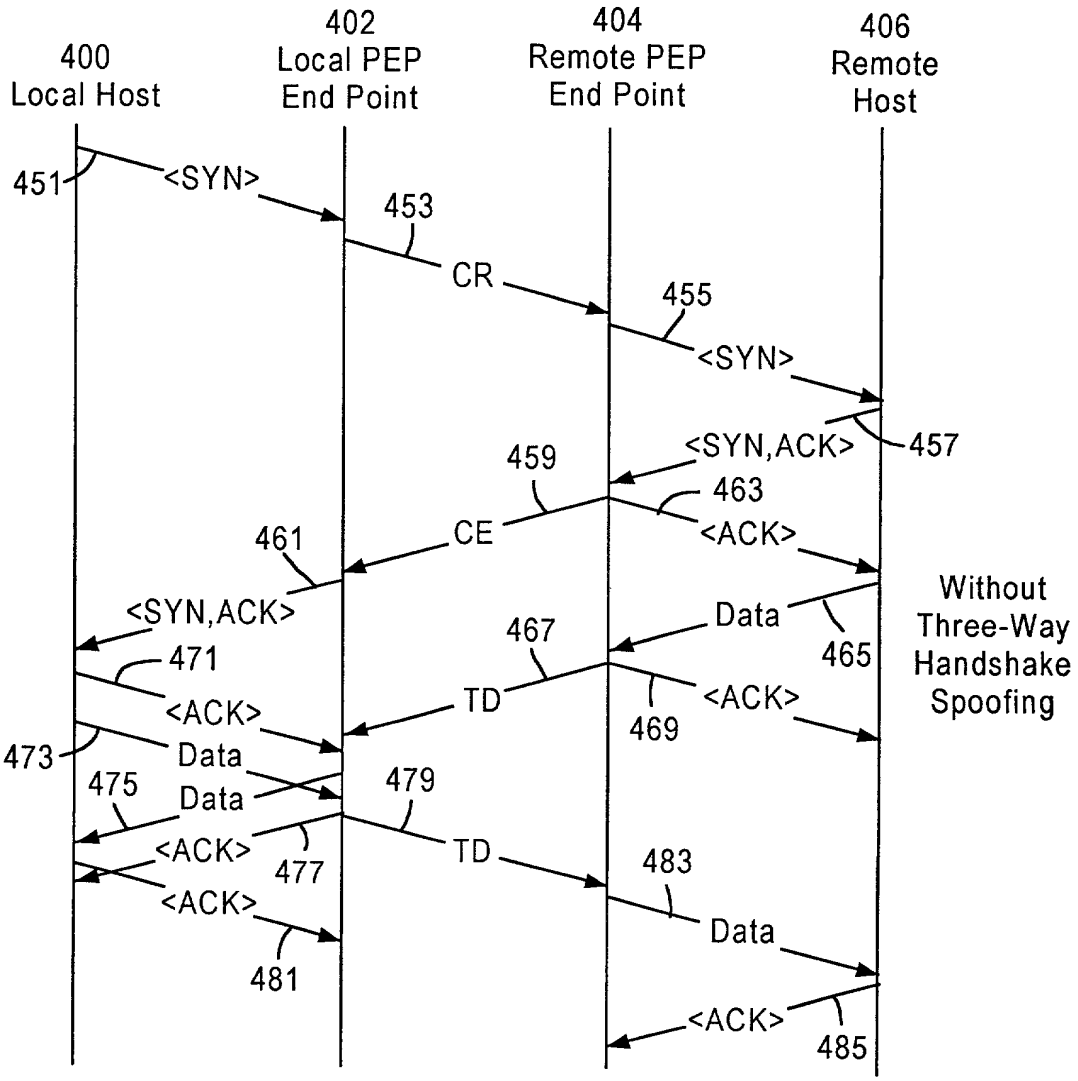
400
Local Host
402
Local PEP
End Point
404
Remote PEP
End Point
406
Remote
Host
451
<SYN>
453
CR
455
<SYN>
457
<SYN,ACK>
459
463
<ACK>
CE
461
<SYN,ACK>
Data
465
Without
Three-Way
Handshake
Spoofing
467
471
<ACK>
TD
469
<ACK>
473
Data
475
Data
479
<ACK>
477
TD
483
<ACK>
Data
481
<ACK>
485

FIG. 5

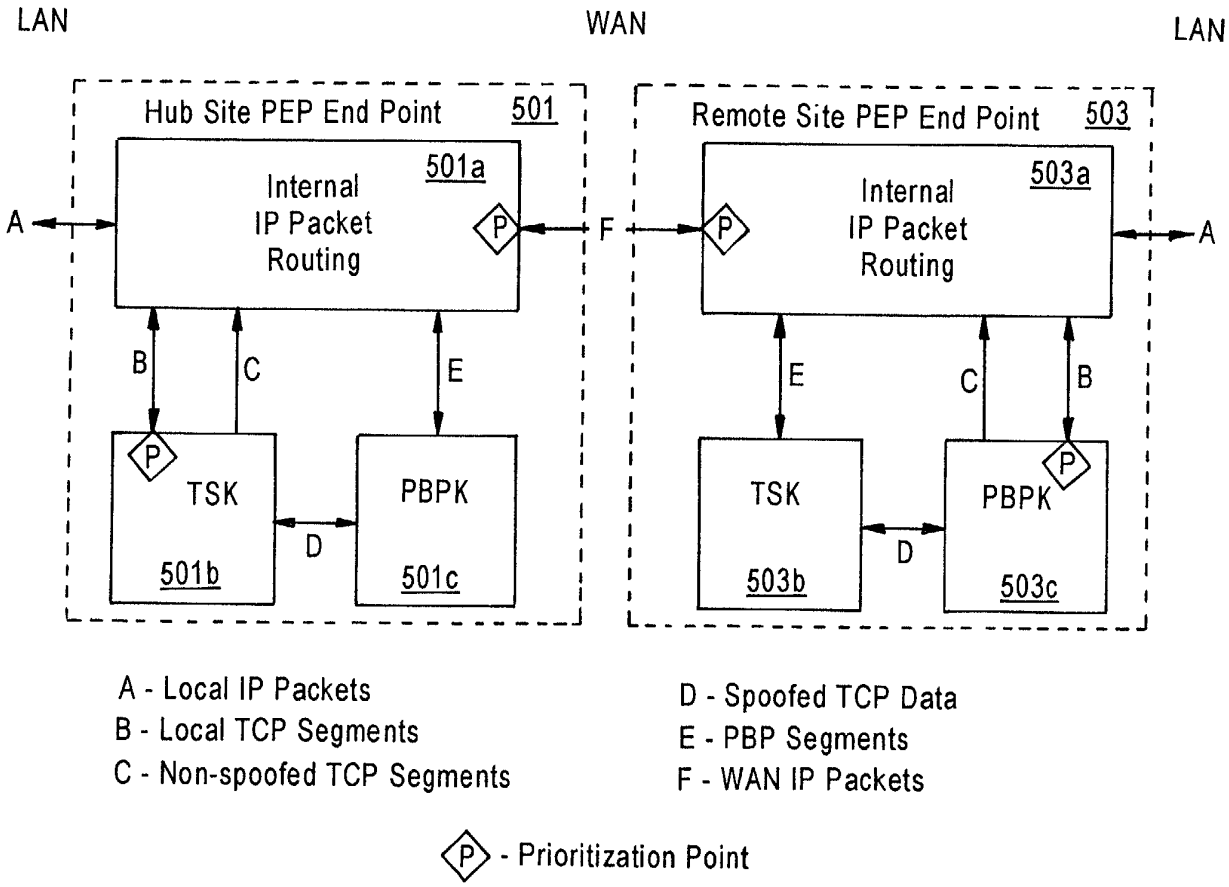
LAN
WAN
LAN
Hub Site PEP End Point
501
501a
Internal
IP Packet
Routing
A
F
B
C
E
TSK
501b
PBPK
501c
D
Remote Site PEP End Point
503
503a
Internal
IP Packet
Routing
A
E
C
B
TSK
503b
PBPK
503c
D
A - Local IP Packets
B - Local TCP Segments
C - Non-spoofed TCP Segments
D - Spoofed TCP Data
E - PBP Segments
F - WAN IP Packets
P - Prioritization Point

FIG. 6

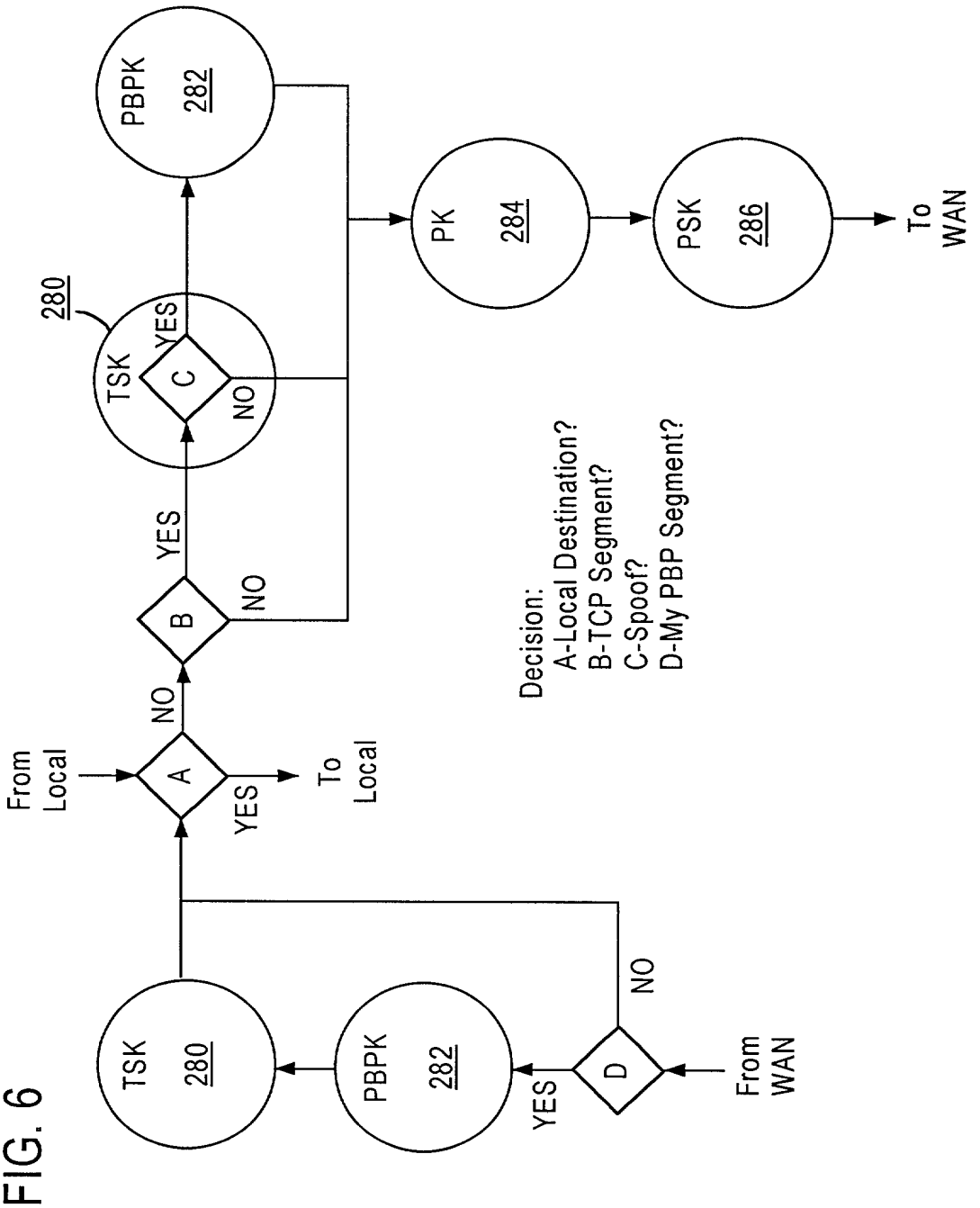
TSK
280
PBPK
282
YES
NO
D
From
WAN
YES
NO
A
From
Local
To
Local
B
YES
NO
280
TSK
C
YES
NO
PBPK
282
PK
284
PSK
286
To
WAN
Decision:
A-Local Destination?
B-TCP Segment?
C-Spoof?
D-My PBP Segment?

FIG. 7

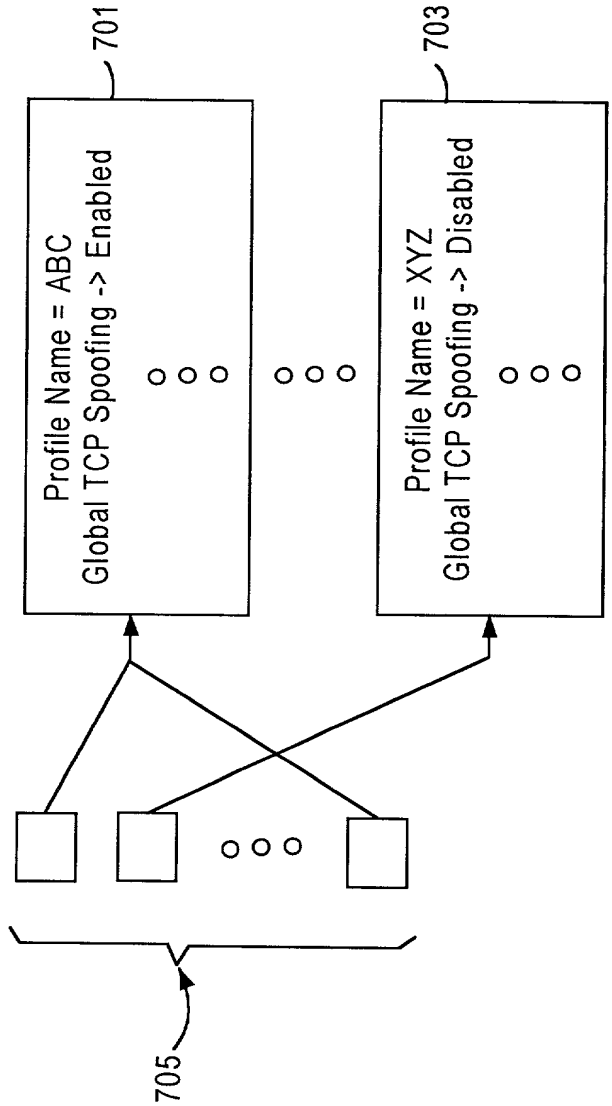
PEP End Point Profiles
PEP End Points
Profile Name = ABC
Global TCP Spoofing -> Enabled
Profile Name = XYZ
Global TCP Spoofing -> Disabled
701
703
705

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FIG. 8

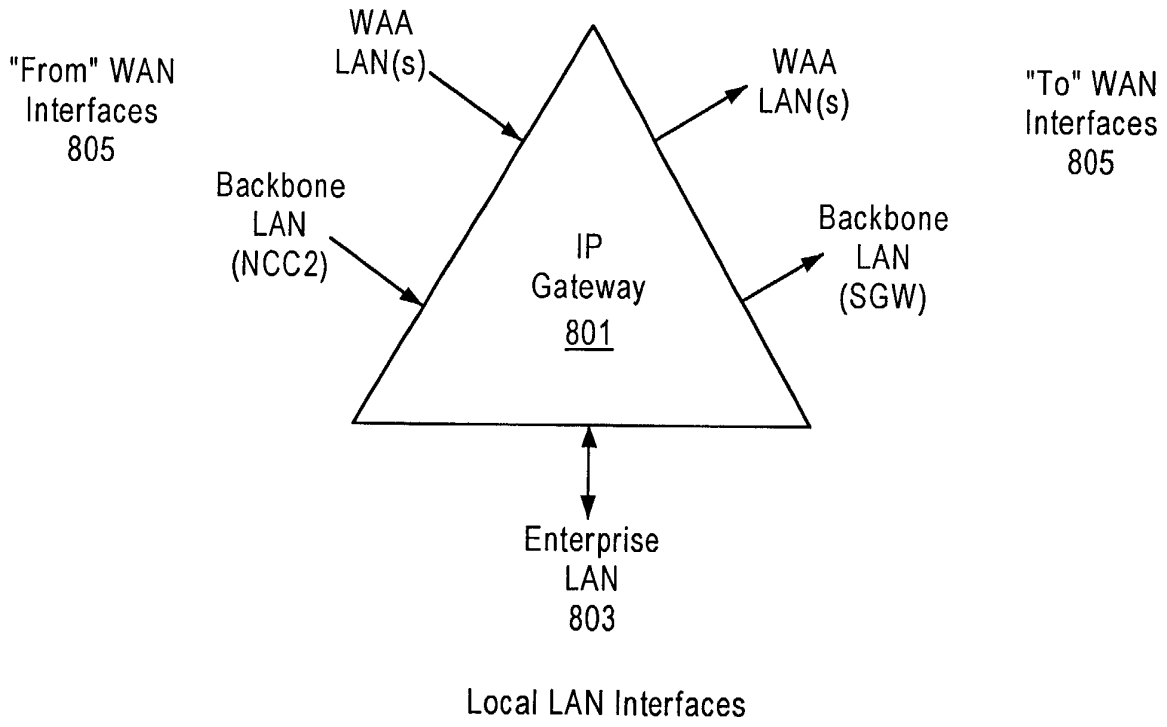

FIG. 9

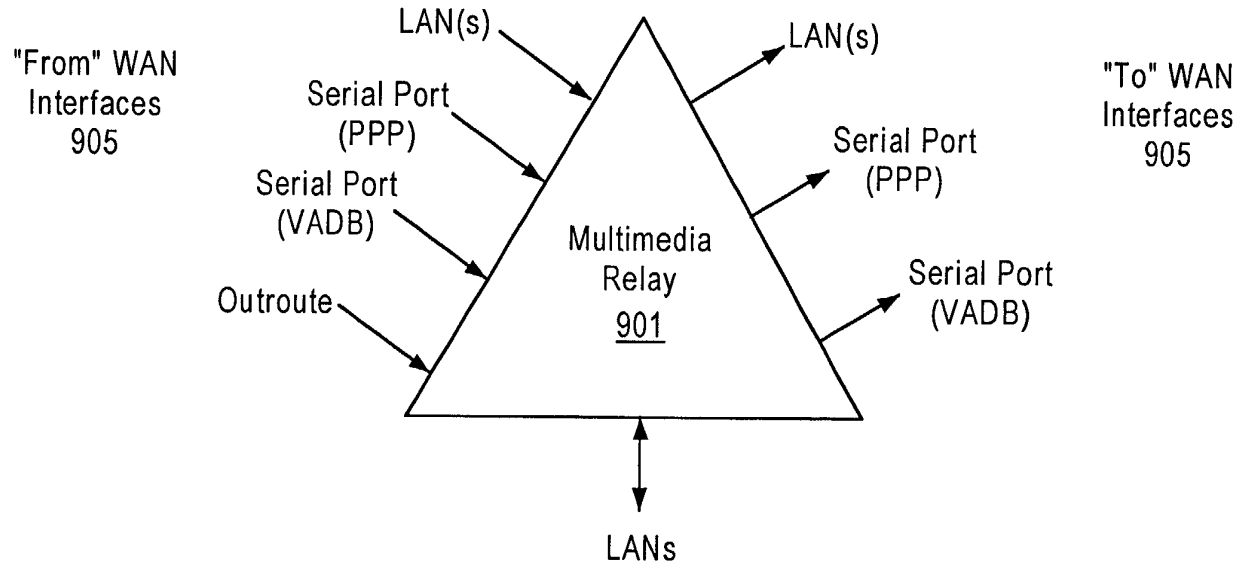
"From" WAN Interfaces 905
LAN(s)
Serial Port (PPP)
Serial Port (VADB)
Outroute
Multimedia Relay 901
LAN(s)
Serial Port (PPP)
Serial Port (VADB)
"To" WAN Interfaces 905
LANs
Local LAN Interfaces 903

FIG. 10

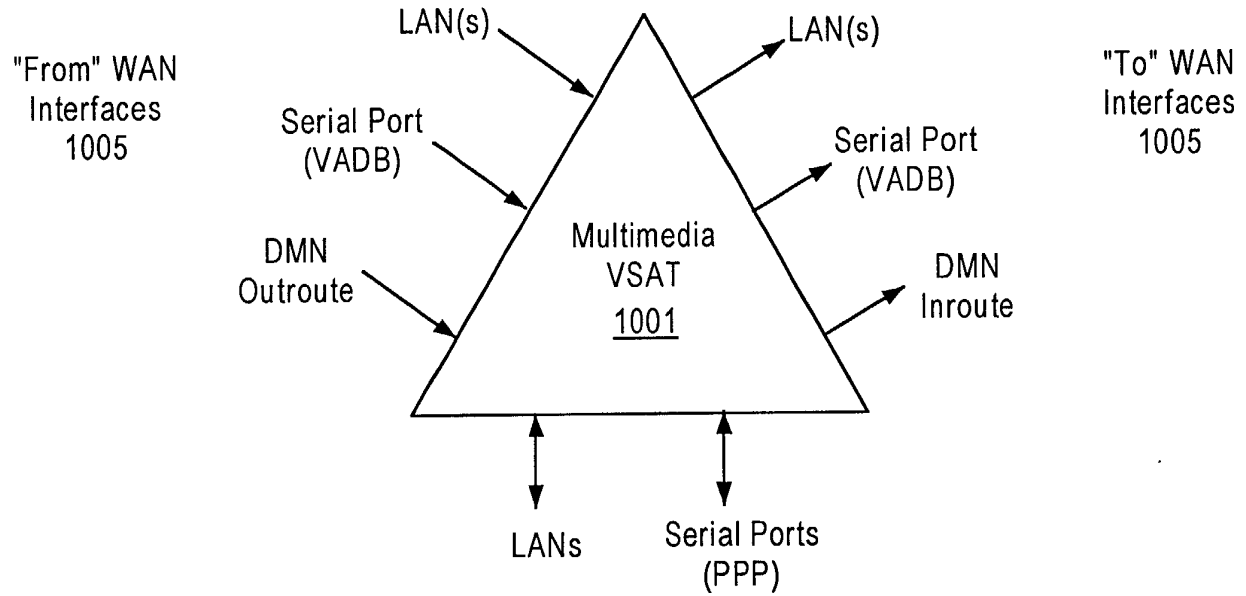
"From" WAN Interfaces 1005
LAN(s)
Serial Port (VADB)
DMN Outroute
Multimedia VSAT 1001
LAN(s)
Serial Port (VADB)
DMN Inroute
"To" WAN Interfaces 1005
LANs
Serial Ports (PPP)
Local LAN Interfaces 1003

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FIG. 11

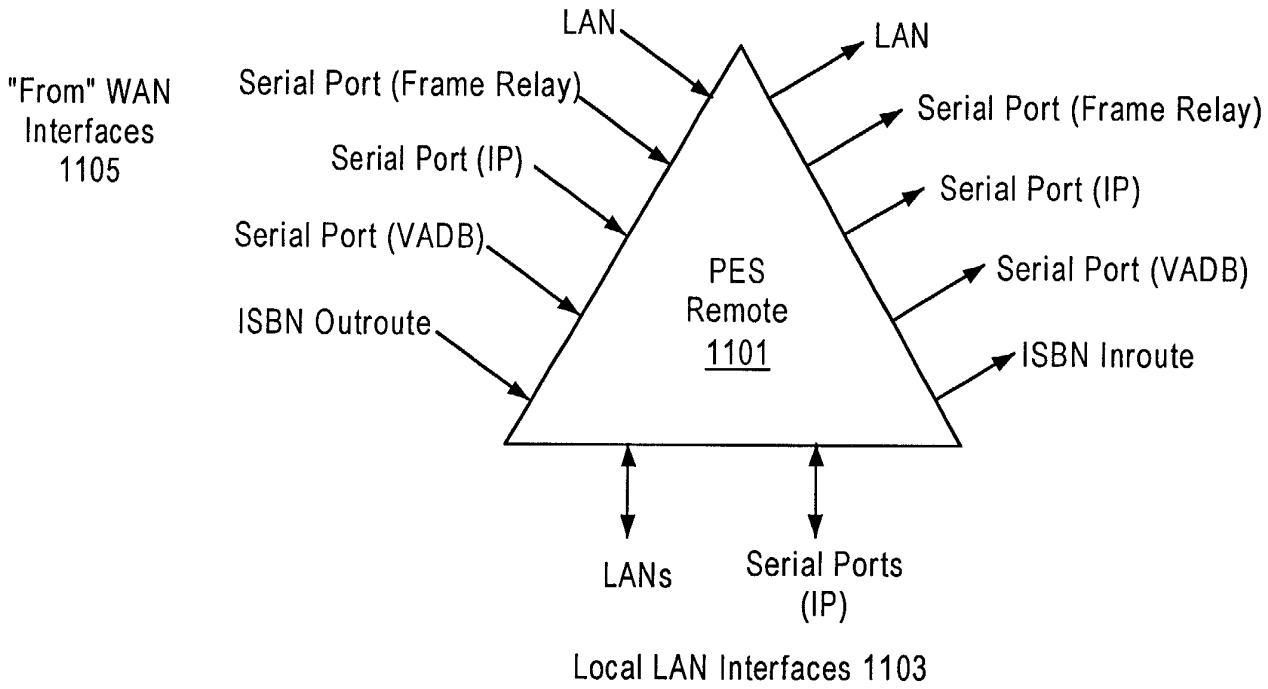

FIG. 12

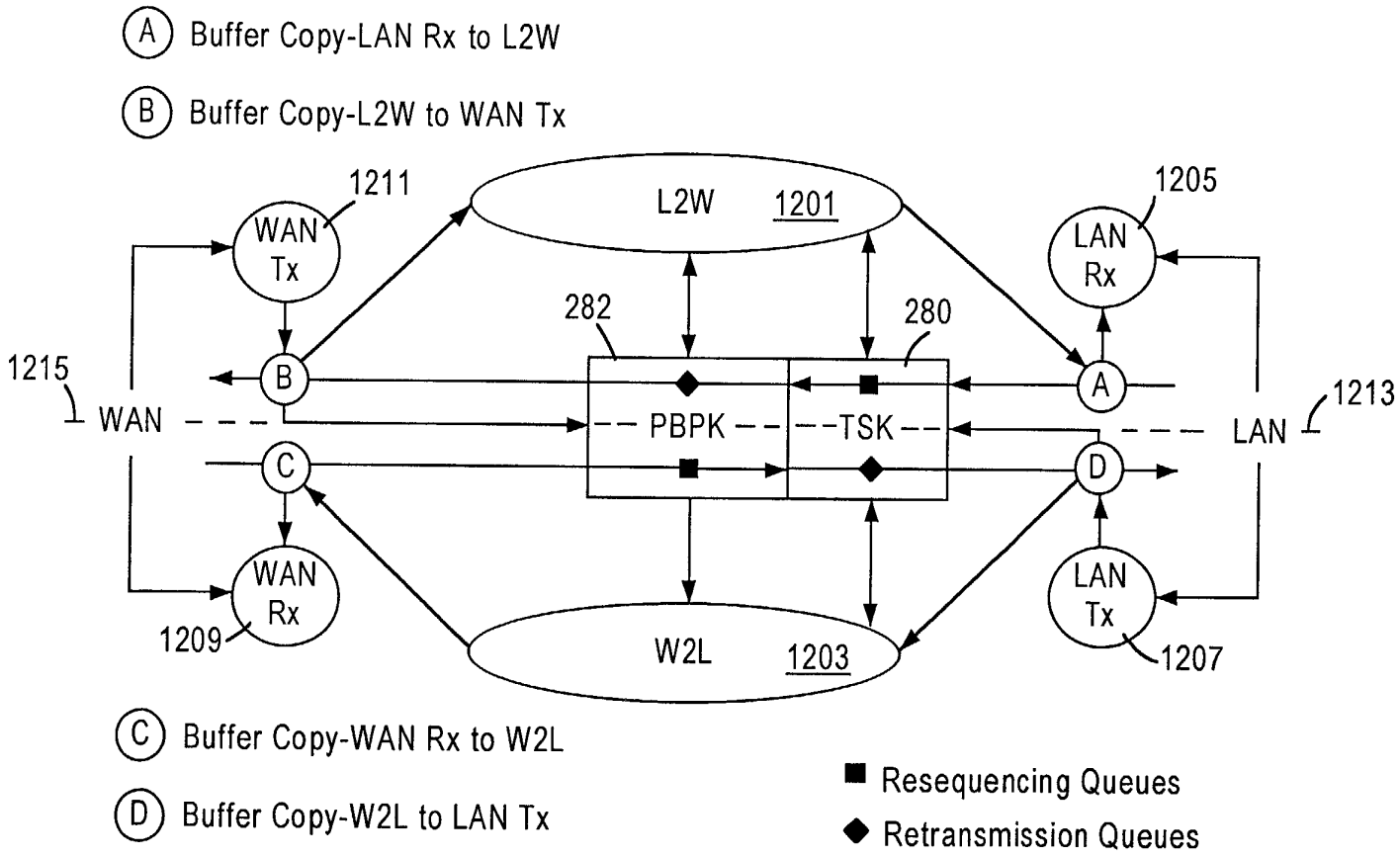
A Buffer Copy-LAN Rx to L2W
B Buffer Copy-L2W to WAN Tx
1211
WAN Tx
L2W 1201
1205
LAN Rx
282
280
1215
WAN
B
PBPK
TSK
A
1213
LAN
C
D
WAN Rx
1209
W2L 1203
LAN Tx
1207
C Buffer Copy-WAN Rx to W2L
D Buffer Copy-W2L to LAN Tx
Resequencing Queues
Retransmission Queues

FIG. 13

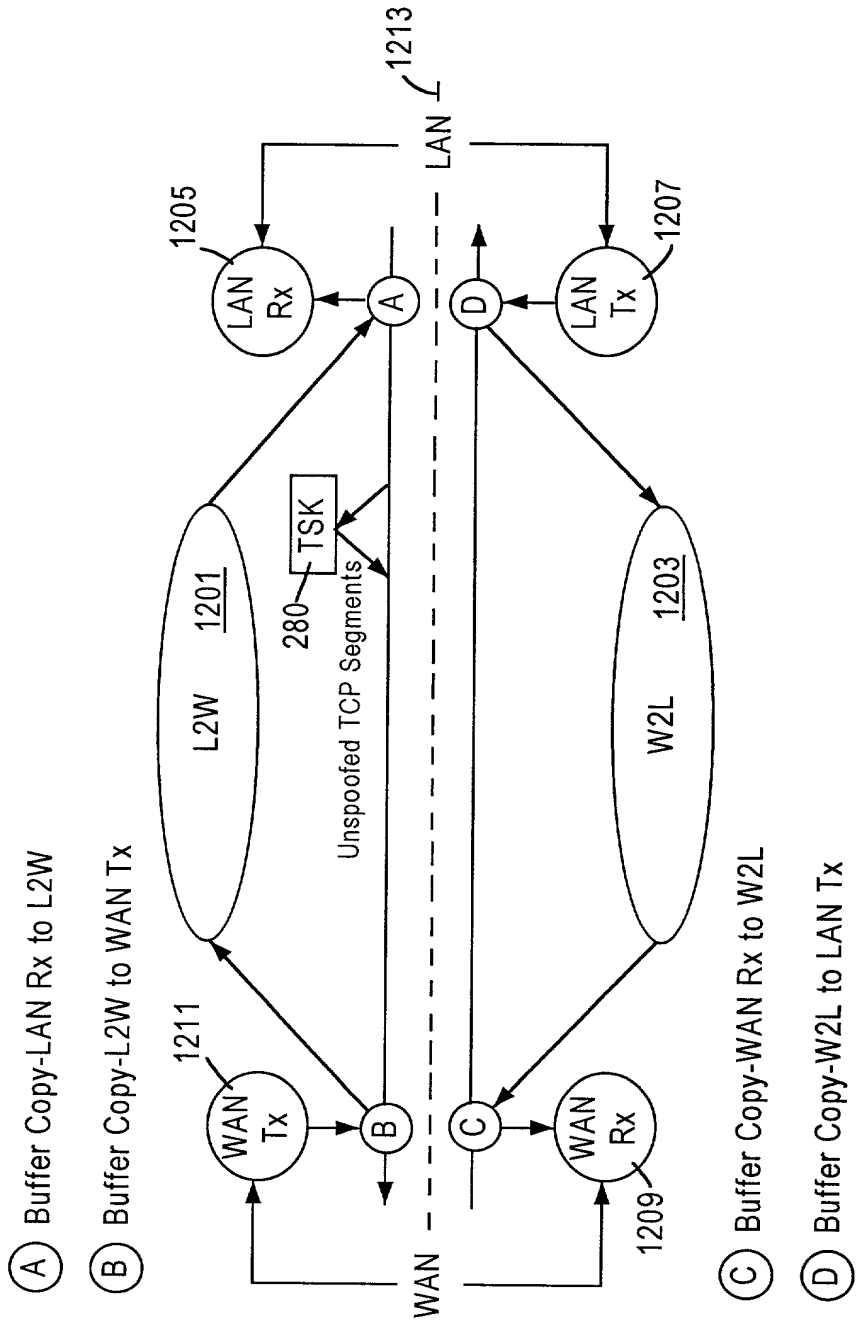
A Buffer Copy-LAN Rx to L2W
B Buffer Copy-L2W to WAN Tx
C Buffer Copy-WAN Rx to W2L
D Buffer Copy-W2L to LAN Tx
WAN
LAN
1215
1213
1211
1209
1205
1207
WAN Tx
WAN Rx
LAN Rx
LAN Tx
A
B
C
D
L2W 1201
W2L 1203
280
TSK
Unspoofed TCP Segments

FIG. 14

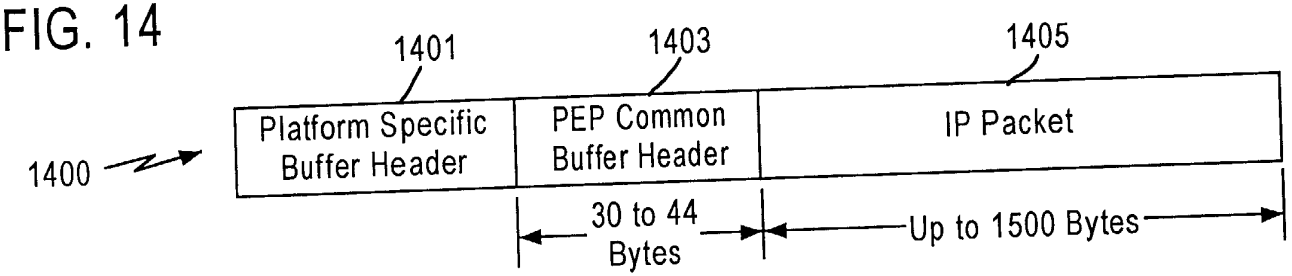
1401
1403
1405
1400
Platform Specific Buffer Header
PEP Common Buffer Header
IP Packet
30 to 44 Bytes
Up to 1500 Bytes

FIG. 15

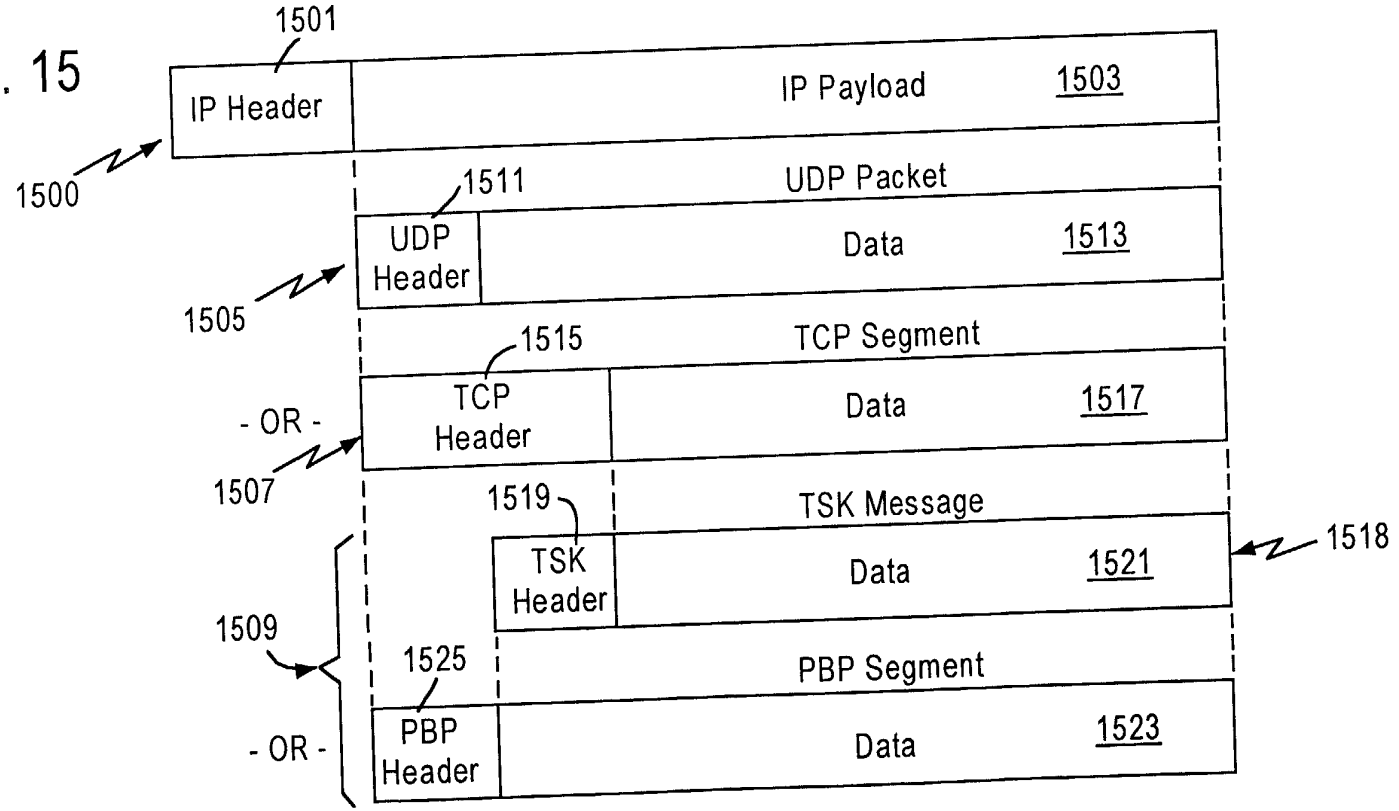
1501
IP Header
IP Payload
1503
1500
1511
UDP Packet
UDP Header
Data
1513
1505
1515
TCP Segment
TCP Header
Data
1517
- OR -
1507
1519
TSK Message
TSK Header
Data
1521
1518
1509
1525
PBP Segment
PBP Header
Data
1523
- OR -

FIG. 16

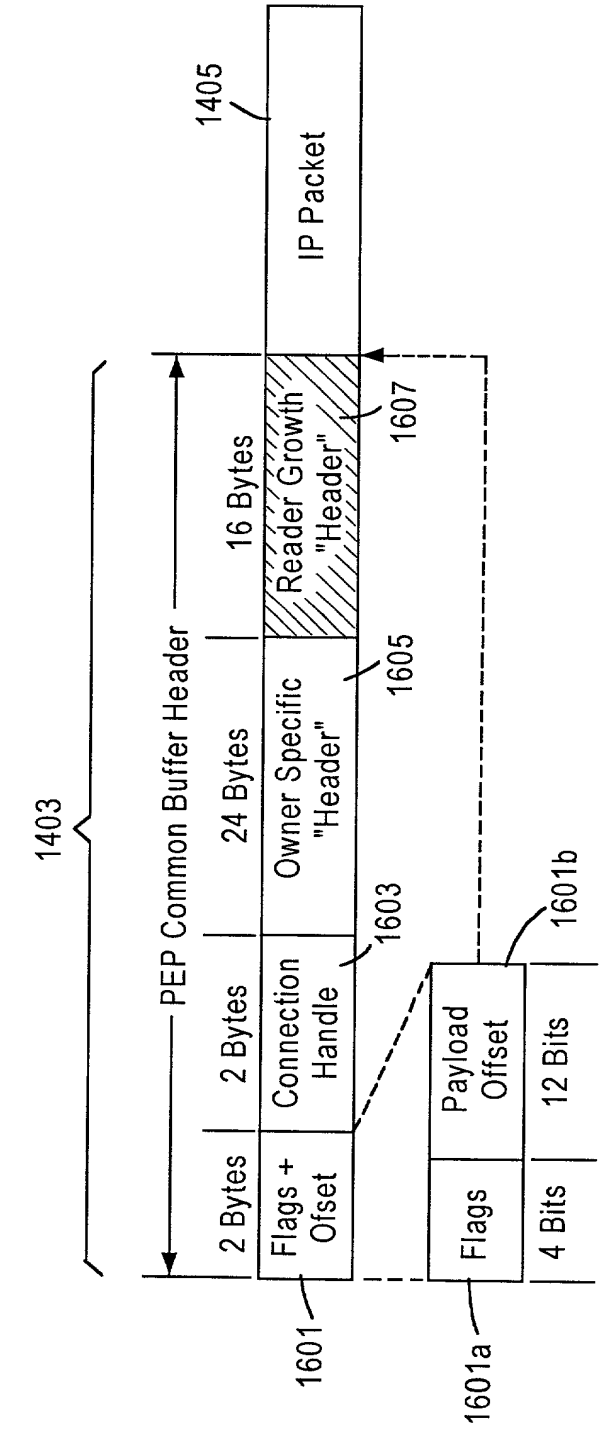
1403
PEP Common Buffer Header
2 Bytes
24 Bytes
16 Bytes
Flags + Ofset
Connection Handle
Owner Specific "Header"
Reader Growth "Header"
IP Packet
1405
1607
1605
1603
1601
Flags
Payload Offset
4 Bits
12 Bits
1601a
1601b

FIG. 17

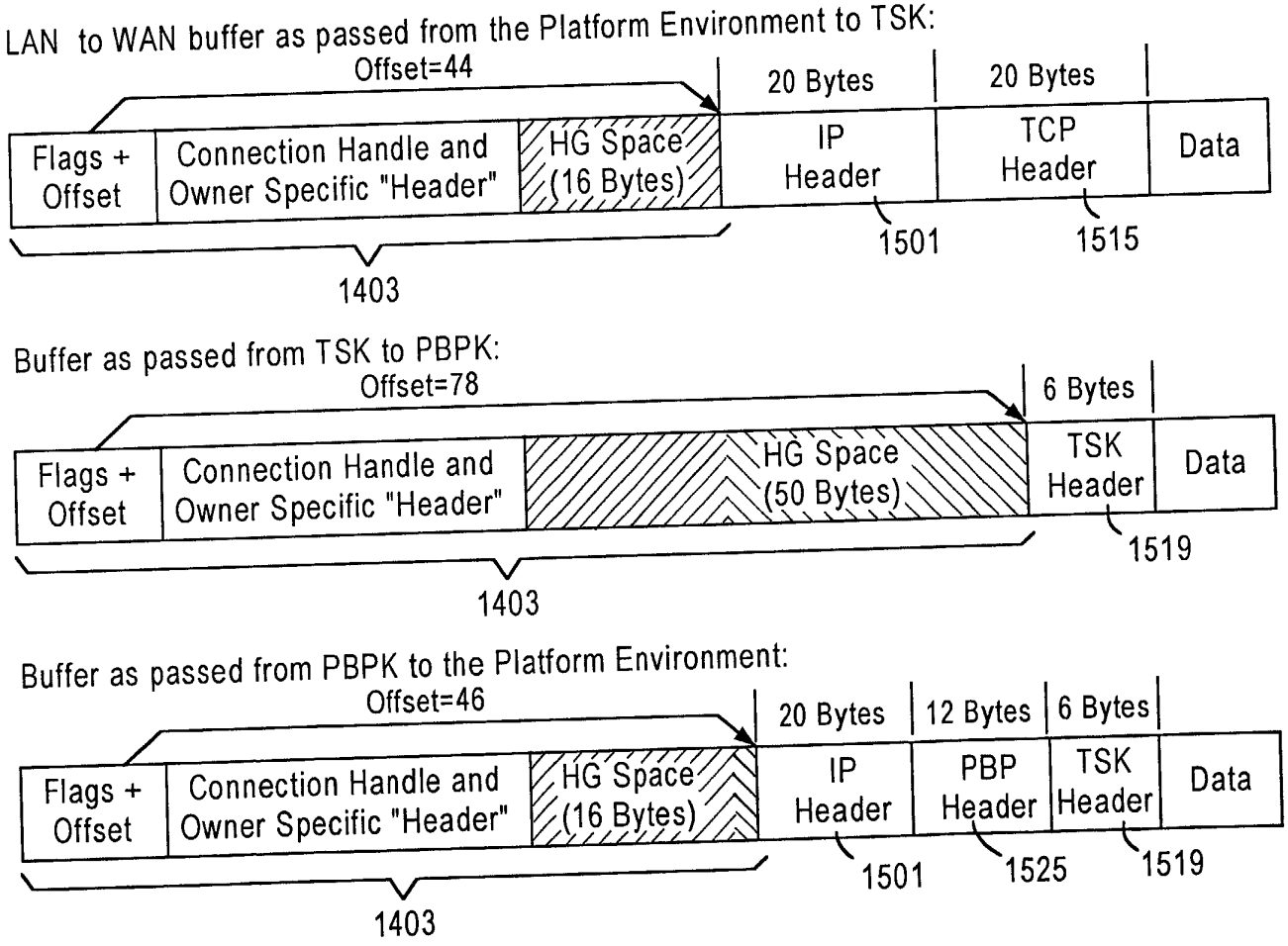
LAN to WAN buffer as passed from the Platform Environment to TSK:
Offset=44
20 Bytes
20 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
TCP Header
Data
1501
1515
1403
Buffer as passed from TSK to PBPK:
Offset=78
6 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (50 Bytes)
TSK Header
Data
1519
1403
Buffer as passed from PBPK to the Platform Environment:
Offset=46
20 Bytes
12 Bytes
6 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
PBP Header
TSK Header
Data
1501
1525
1519
1403

FIG. 19

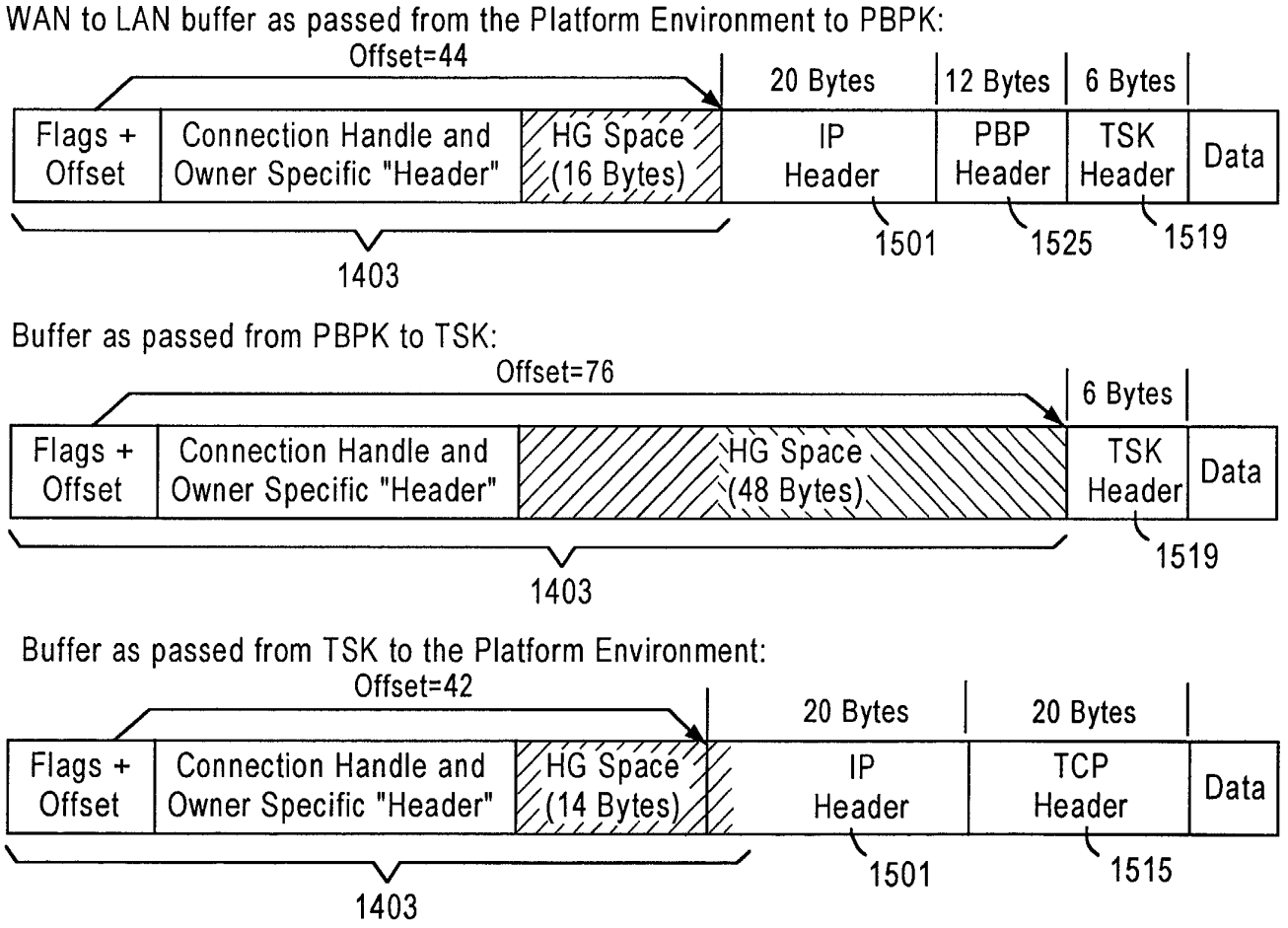
WAN to LAN buffer as passed from the Platform Environment to PBPK:
Offset=44
20 Bytes
12 Bytes
6 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
PBP Header
TSK Header
Data
1501
1525
1519
1403
Buffer as passed from PBPK to TSK:
Offset=76
6 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (48 Bytes)
TSK Header
Data
1519
1403
Buffer as passed from TSK to the Platform Environment:
Offset=42
20 Bytes
20 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (14 Bytes)
IP Header
TCP Header
Data
1501
1515
1403

FIG. 18

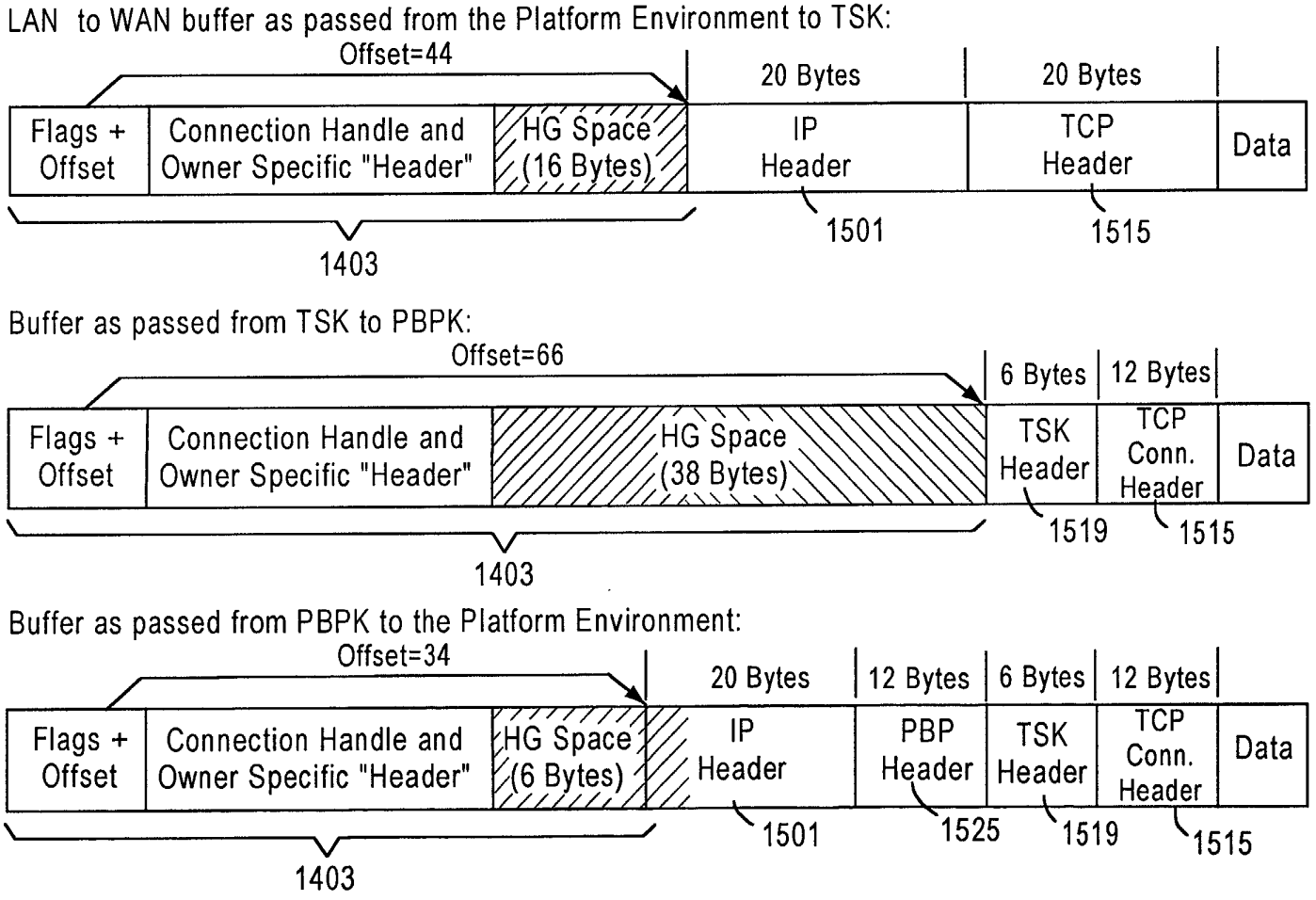
LAN to WAN buffer as passed from the Platform Environment to TSK:
Offset=44
20 Bytes
20 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
TCP Header
Data
1403
1501
1515
Buffer as passed from TSK to PBPK:
Offset=66
6 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (38 Bytes)
TSK Header
TCP Conn. Header
Data
1403
1519
1515
Buffer as passed from PBPK to the Platform Environment:
Offset=34
20 Bytes
12 Bytes
6 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (6 Bytes)
IP Header
PBP Header
TSK Header
TCP Conn. Header
Data
1403
1501
1525
1519
1515

FIG. 20

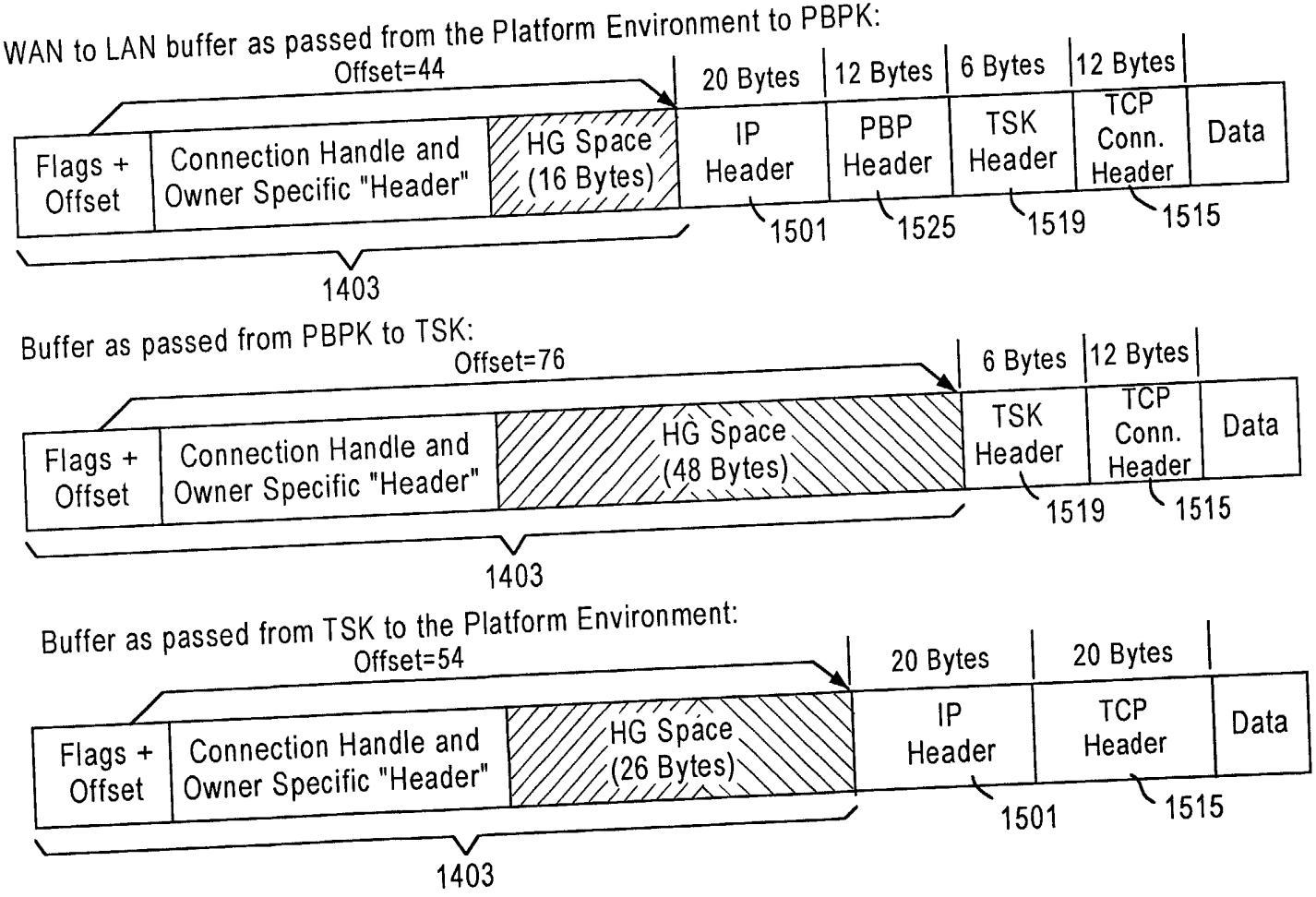
WAN to LAN buffer as passed from the Platform Environment to PBPK:
Offset=44
20 Bytes
12 Bytes
6 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
PBP Header
TSK Header
TCP Conn. Header
Data
1501
1525
1519
1515
1403
Buffer as passed from PBPK to TSK:
Offset=76
6 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (48 Bytes)
TSK Header
TCP Conn. Header
Data
1519
1515
1403
Buffer as passed from TSK to the Platform Environment:
Offset=54
20 Bytes
20 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (26 Bytes)
IP Header
TCP Header
Data
1501
1515
1403

FIG. 21

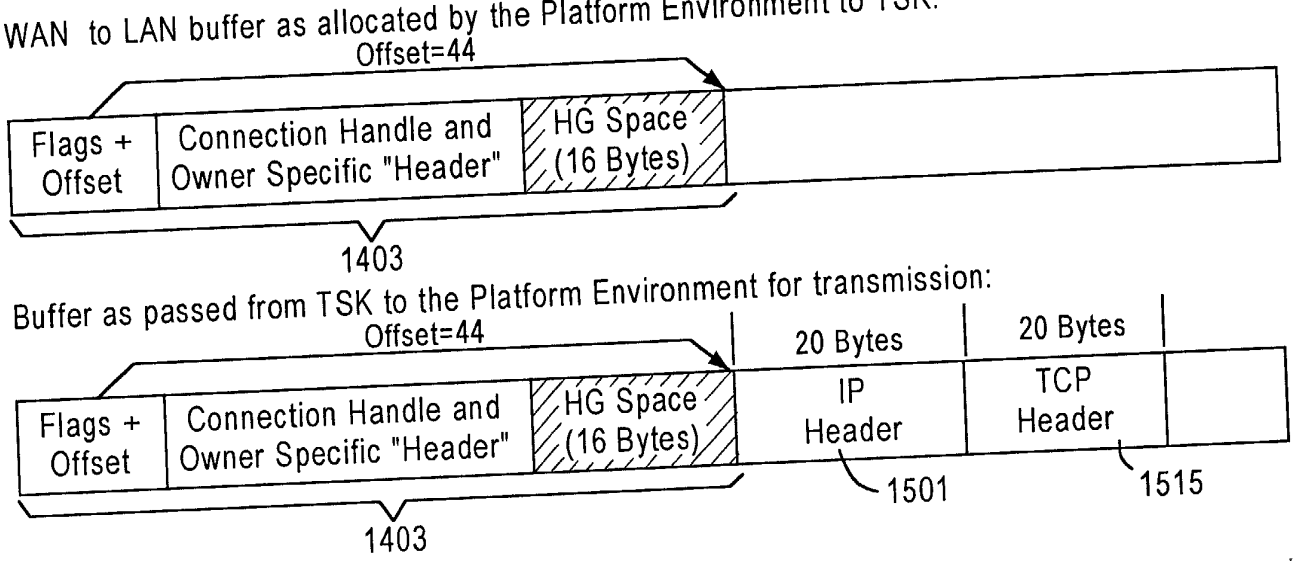
WAN to LAN buffer as allocated by the Platform Environment to TSK:
Offset=44
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
1403
Buffer as passed from TSK to the Platform Environment for transmission:
Offset=44
20 Bytes
20 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
TCP Header
1501
1515
1403

FIG. 22

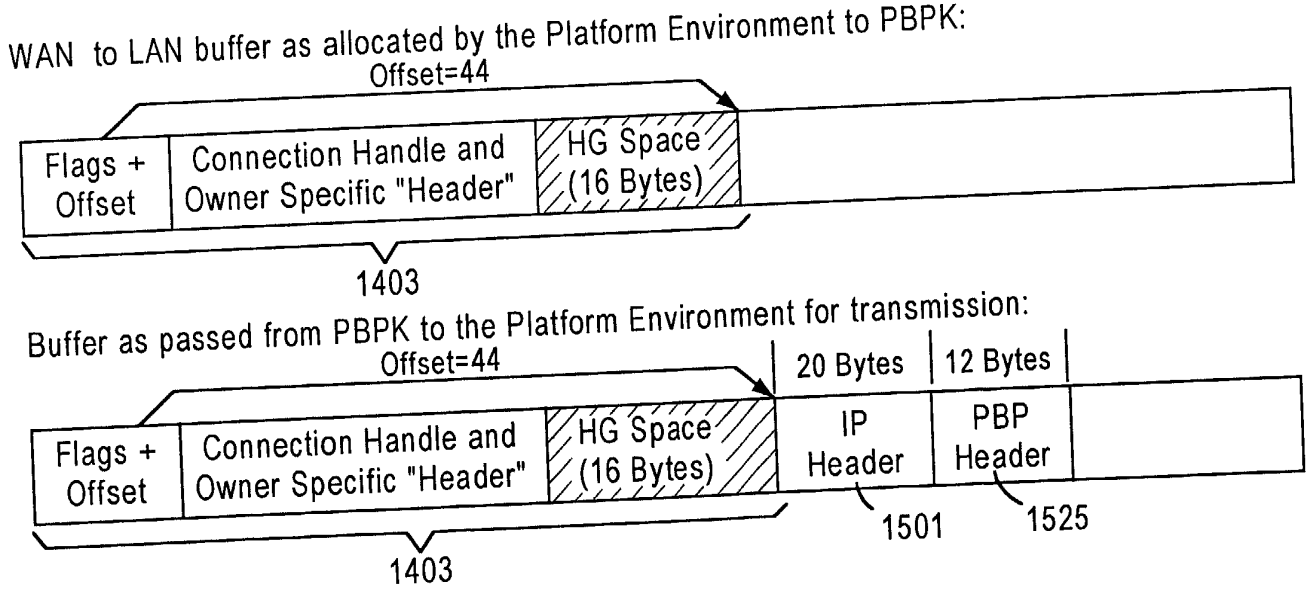
WAN to LAN buffer as allocated by the Platform Environment to PBPK:
Offset=44
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
1403
Buffer as passed from PBPK to the Platform Environment for transmission:
Offset=44
20 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
PBP Header
1501
1525
1403

FIG. 23

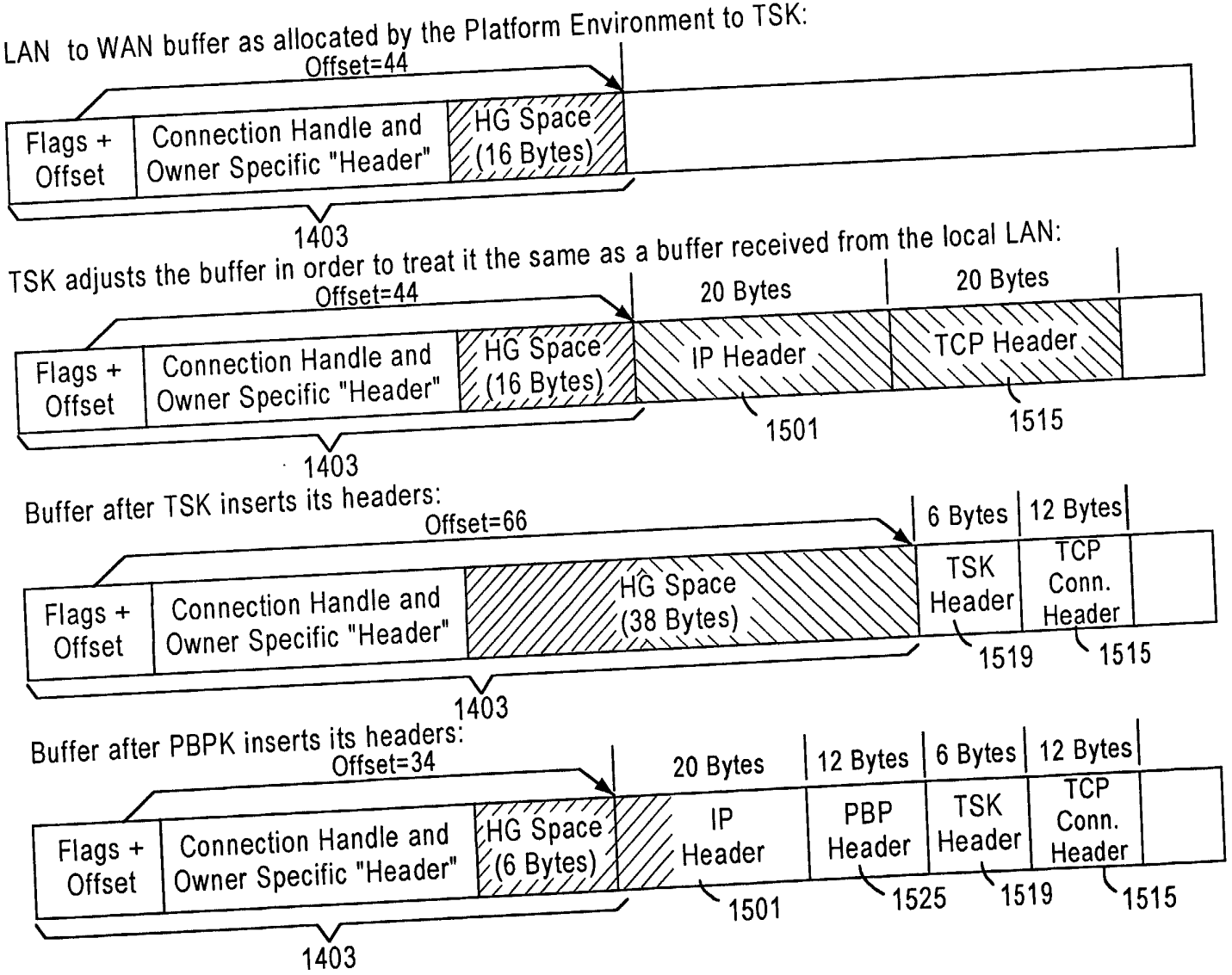
LAN to WAN buffer as allocated by the Platform Environment to TSK:
Offset=44
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
1403
TSK adjusts the buffer in order to treat it the same as a buffer received from the local LAN:
Offset=44
20 Bytes
20 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (16 Bytes)
IP Header
TCP Header
1501
1515
1403
Buffer after TSK inserts its headers:
Offset=66
6 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (38 Bytes)
TSK Header
TCP Conn. Header
1519
1515
1403
Buffer after PBPK inserts its headers:
Offset=34
20 Bytes
12 Bytes
6 Bytes
12 Bytes
Flags + Offset
Connection Handle and Owner Specific "Header"
HG Space (6 Bytes)
IP Header
PBP Header
TSK Header
TCP Conn. Header
1501
1525
1519
1515
1403

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FIG. 24

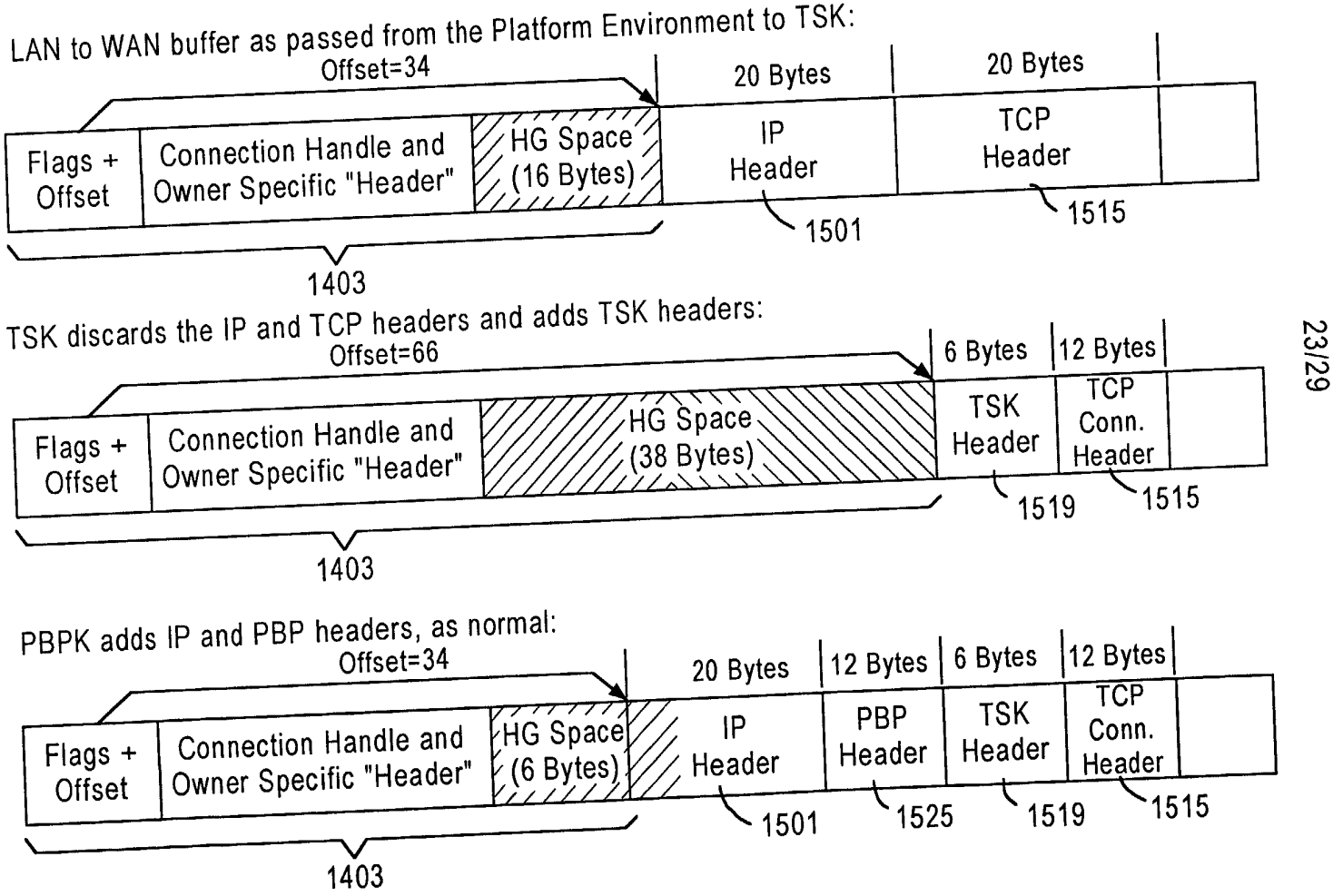

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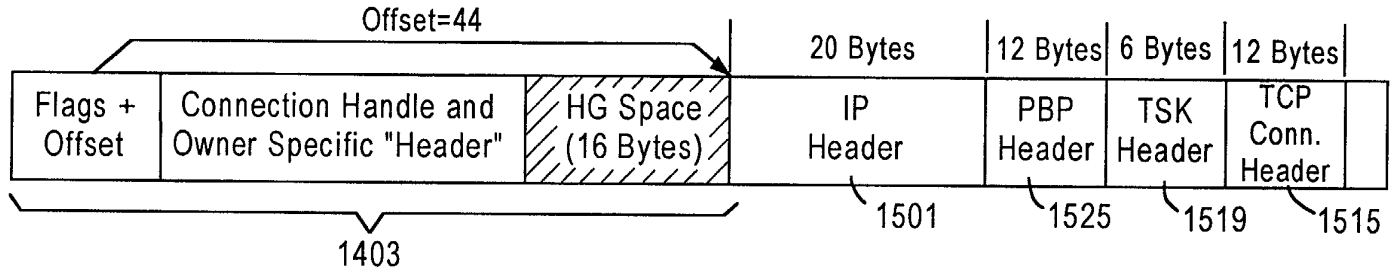
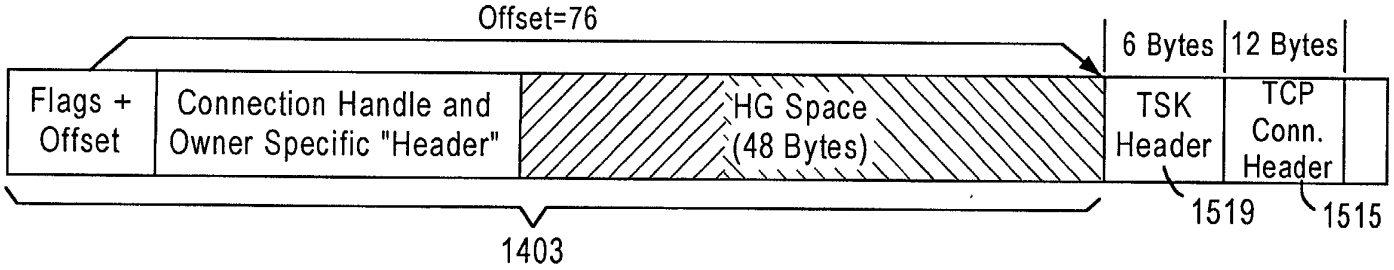
FIG. 25

WAN to LAN buffer as passed from the Platform Environment to PBPK:



Buffer as passed from PBPK to TSK:



TSK discards the TSK headers and adds IP and TCP headers:

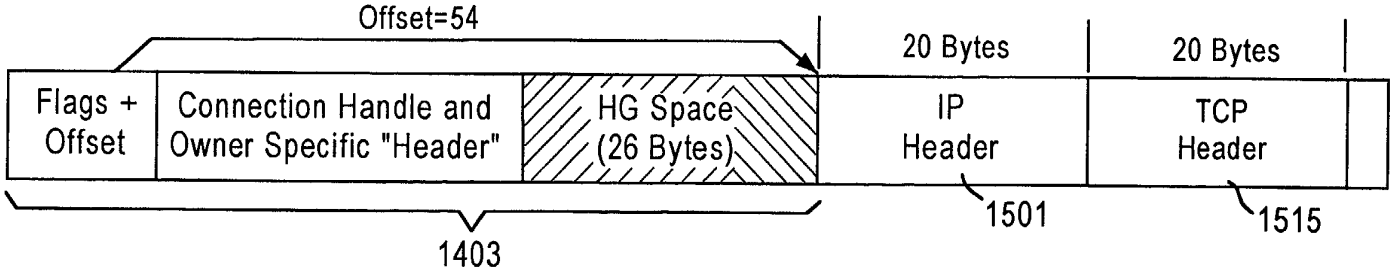


FIG. 26

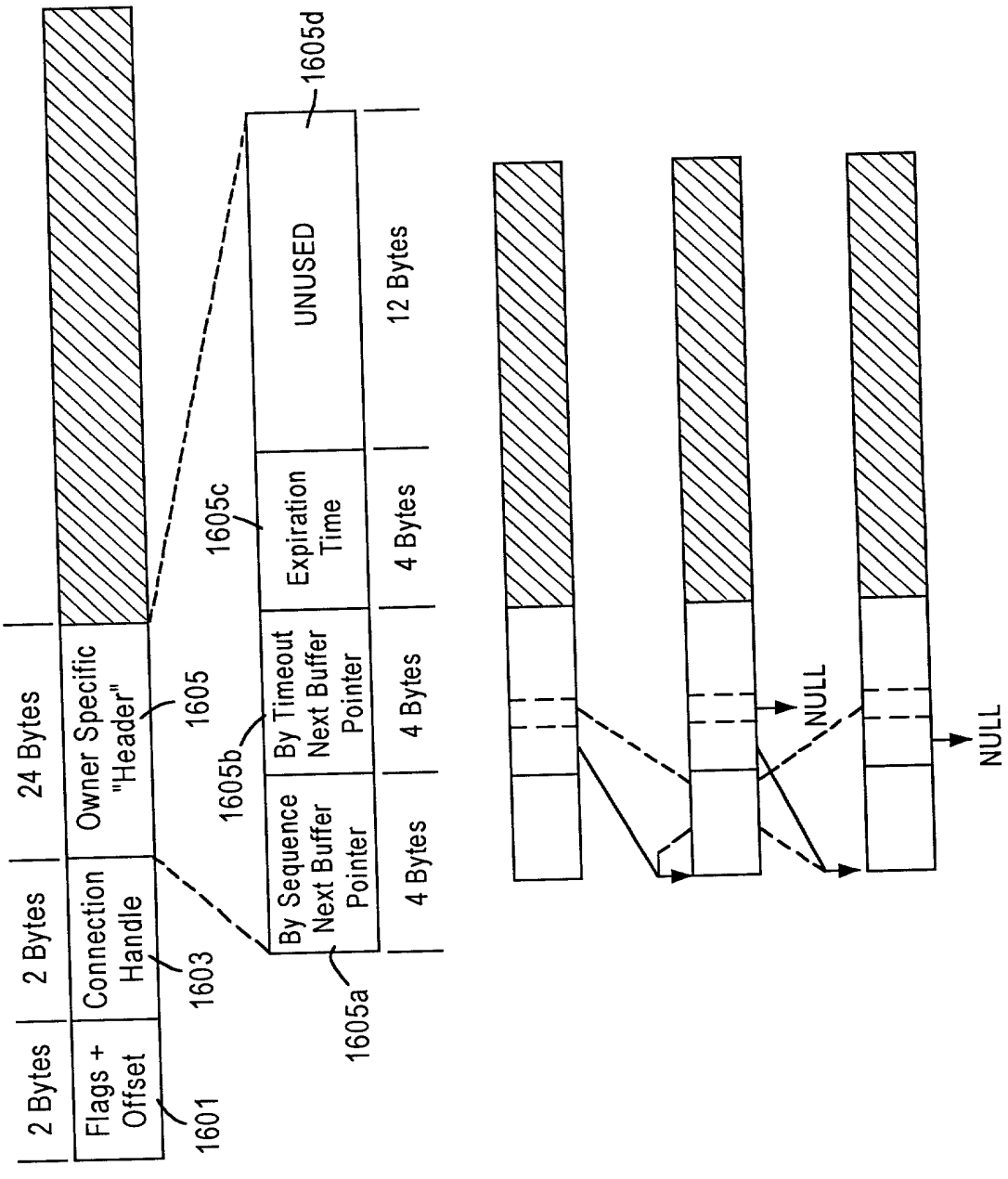

2 Bytes
2 Bytes
24 Bytes
Flags + Offset
Connection Handle
Owner Specific "Header"
1601
1603
1605
1605a
By Sequence Next Buffer Pointer
By Timeout Next Buffer Pointer
Expiration Time
UNUSED
1605b
1605c
1605d
4 Bytes
4 Bytes
4 Bytes
12 Bytes
NULL
NULL

FIG. 27

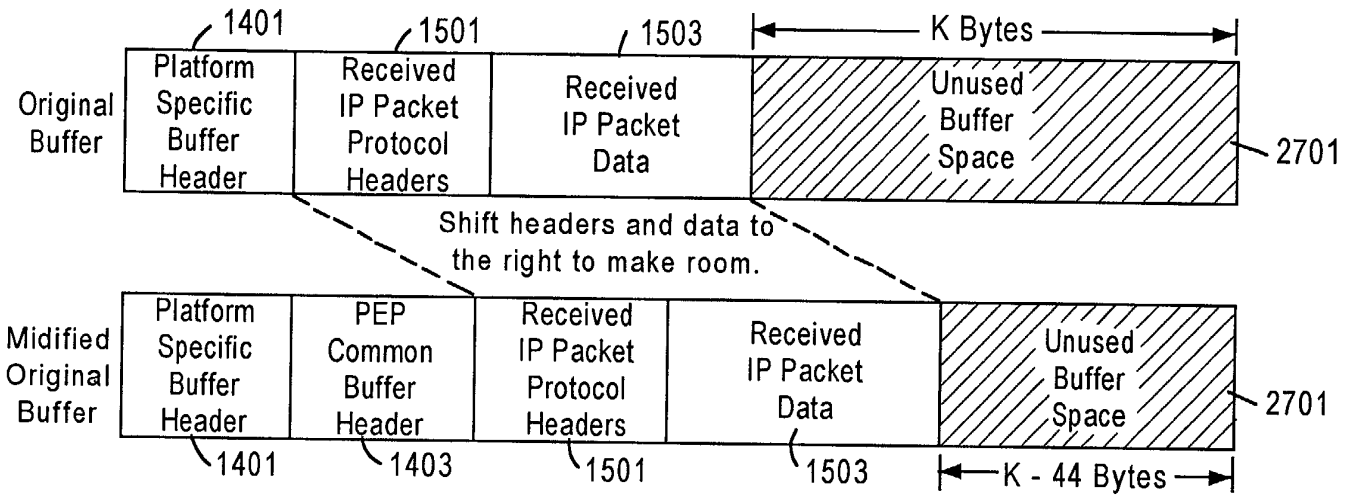

1401
1501
1503
K Bytes
Original Buffer
Platform Specific Buffer Header
Received IP Packet Protocol Headers
Received IP Packet Data
Unused Buffer Space
2701
Shift headers and data to the right to make room.
Midified Original Buffer
Platform Specific Buffer Header
PEP Common Buffer Header
Received IP Packet Protocol Headers
Received IP Packet Data
Unused Buffer Space
2701
1401
1403
1501
1503
K - 44 Bytes

FIG. 28

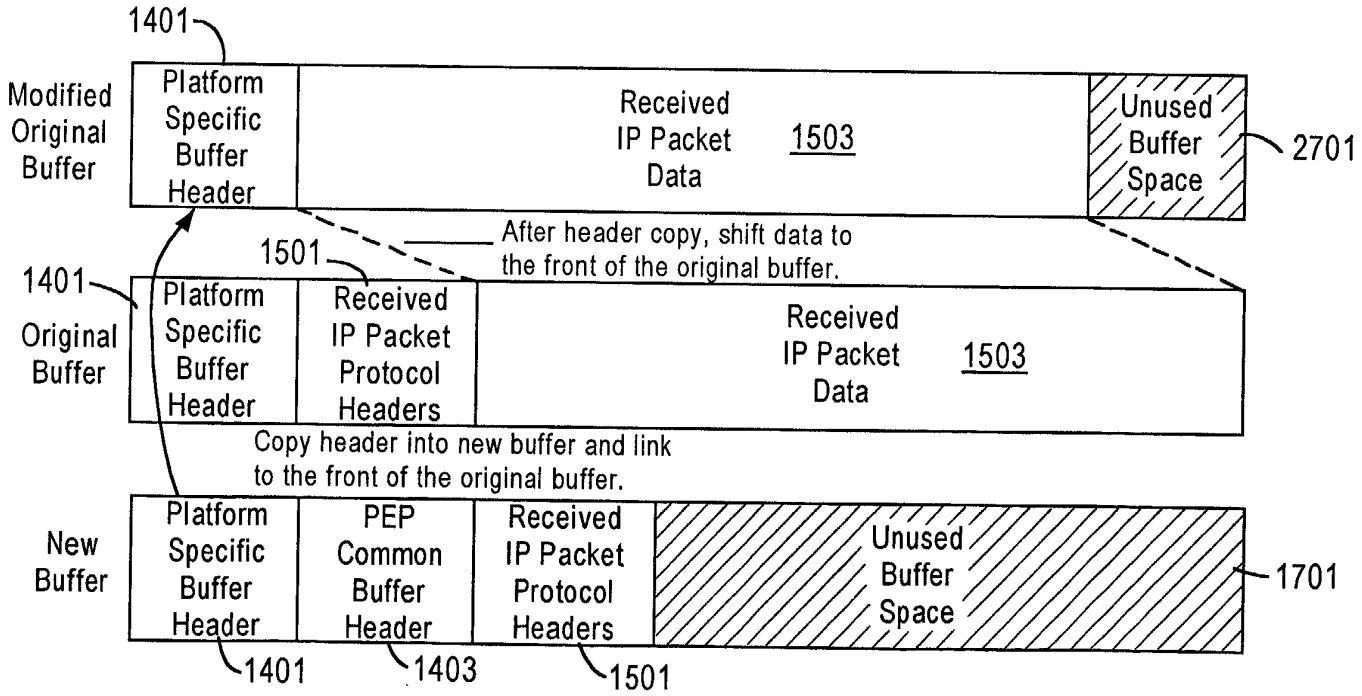

1401
Modified Original Buffer
Platform Specific Buffer Header
Received IP Packet Data 1503
Unused Buffer Space
2701
After header copy, shift data to the front of the original buffer.
1501
1401
Original Buffer
Platform Specific Buffer Header
Received IP Packet Protocol Headers
Received IP Packet Data 1503
Copy header into new buffer and link to the front of the original buffer.
New Buffer
Platform Specific Buffer Header
PEP Common Buffer Header
Received IP Packet Protocol Headers
Unused Buffer Space
1701
1401
1403
1501

FIG. 29

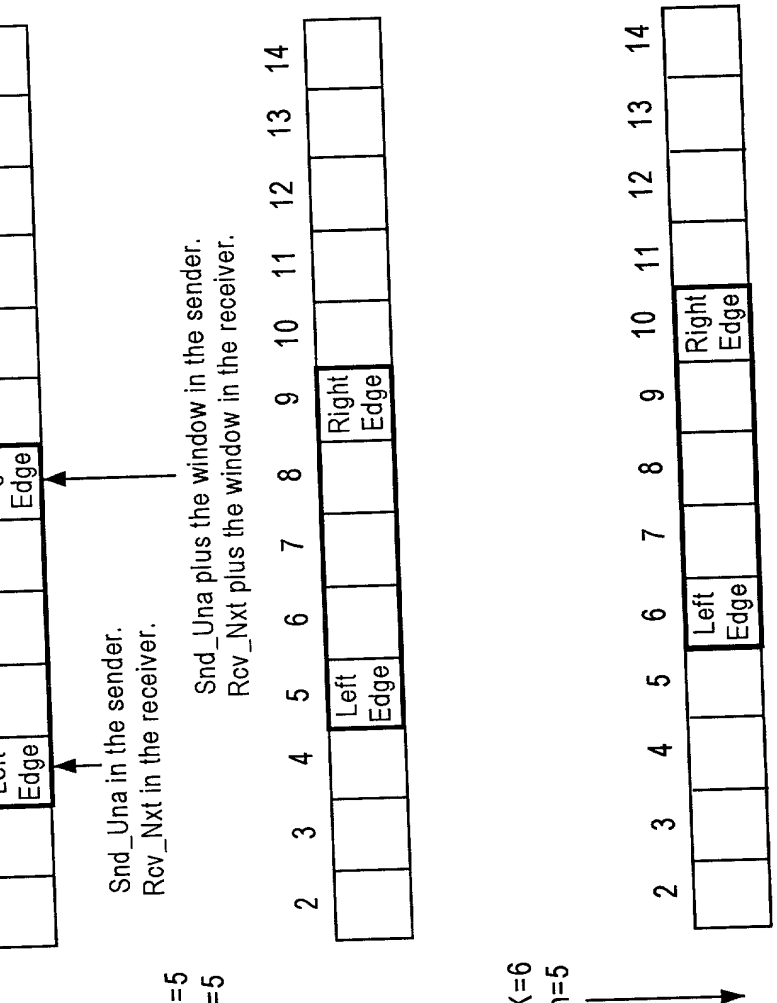

2901
2 3 4 5 6 7 8 9 10 11 12 13 14
Left Edge
Right Edge
Snd_Una in the sender.
Rcv_Nxt in the receiver.
Snd_Una plus the window in the sender.
Rcv_Nxt plus the window in the receiver.
ACK=5
Win=5
ACK=6
Win=5

FIG. 30

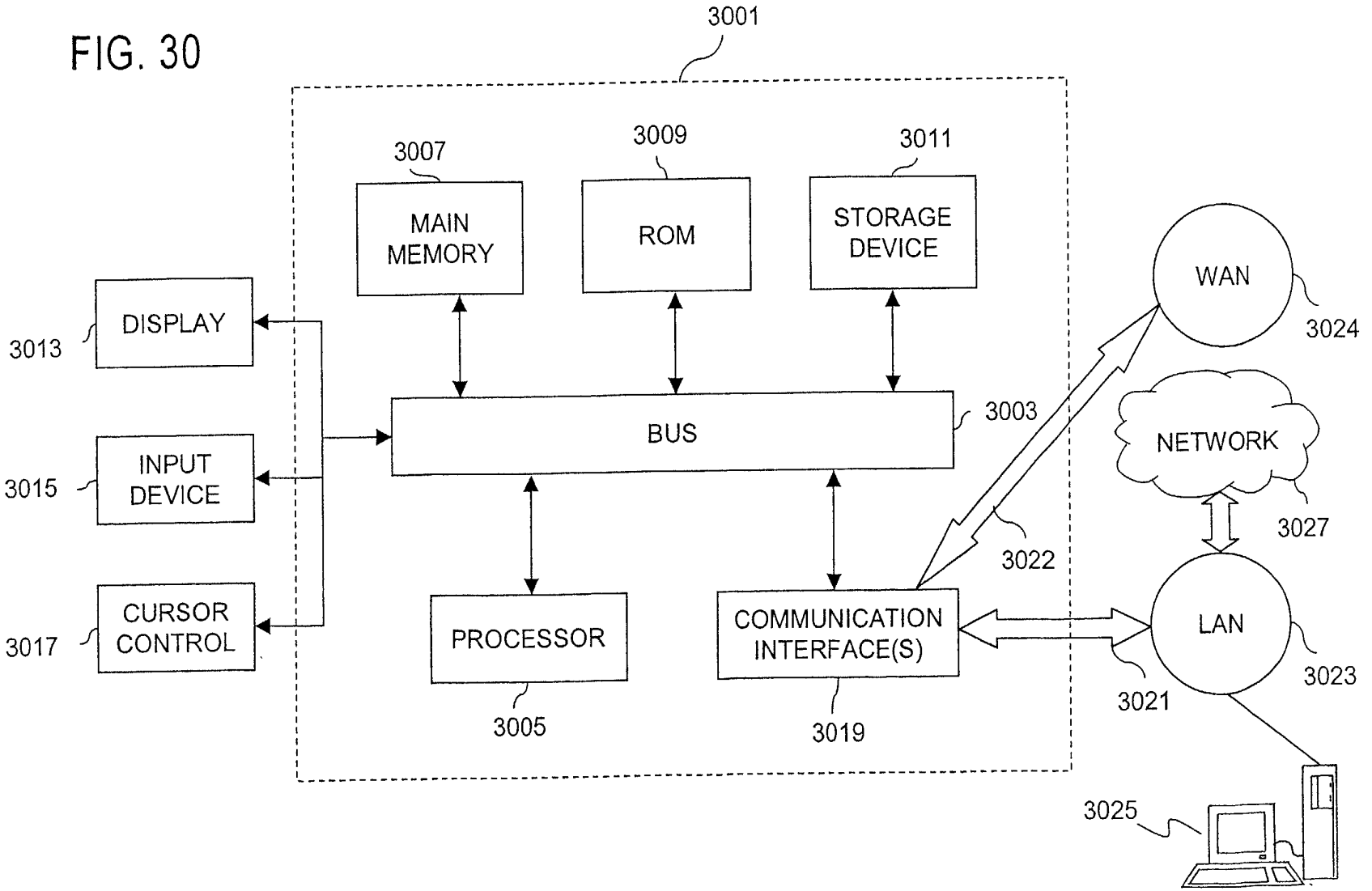

3001
3007
MAIN MEMORY
3009
ROM
3011
STORAGE DEVICE
3013
DISPLAY
3015
INPUT DEVICE
3017
CURSOR CONTROL
BUS
3003
PROCESSOR
3005
COMMUNICATION INTERFACE(S)
3019
3022
WAN
3024
NETWORK
3027
LAN
3023
3021
3025

FIG. 31

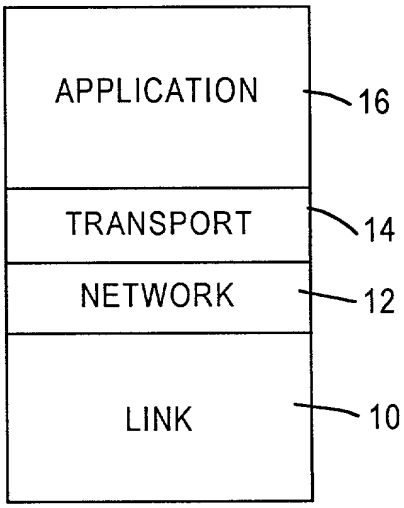
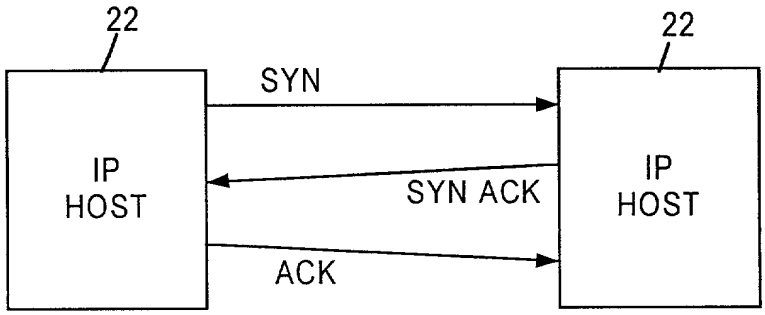


FIG. 32



TCP CONNECTION